

Claims

1. A method for producing a conditionally-immortalized rat neural crest stem cell, comprising:

(a) transfecting rat neural crest cells plated on a first surface and in a first growth medium that permit proliferation with DNA encoding a selectable marker and regulatable growth-promoting gene; and

(b) passaging the transfected cells onto a second surface and in a second growth medium that permit attachment and proliferation; and therefrom producing a conditionally-immortalized rat neural crest stem cell.

2. The method of claim 1, wherein the first and second surfaces are independently selected from the group consisting of substrates comprising one or more of a polyamino acid, fibronectin, laminin, collagen or tissue culture plastic.

3. The method of claim 1, wherein the growth-promoting gene is an oncogene.

4. The method of claim 3, wherein the oncogene is v-myc.

5. A conditionally-immortalized rat neural crest stem cell capable of differentiation into neurons.

6. A method for producing a conditionally-immortalized dorsal root ganglion progenitor cell, comprising:

(a) transfecting dorsal root ganglion progenitor cells plated on a first surface and in a first growth medium that permit proliferation with DNA encoding a selectable marker and regulatable growth-promoting gene; and

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A'

(b) ~~passaging the transfected cells onto a second surface and in a second growth medium that permit attachment and proliferation; and therefrom producing a conditionally-immortalized dorsal root ganglion progenitor cell.~~

7. A method according to claim 6, wherein the dorsal root ganglion progenitor cells are rat cells.

8. A method according to claim 6, wherein the dorsal root ganglion progenitor cells are human cells.

Sub A2
9. ~~A method according to claim 6, wherein the first and second surfaces are independently selected from the group consisting of substrates comprising one or more of a polyamino acid, fibronectin, laminin, collagen or tissue culture plastic.~~

10. The method of claim 6 wherein the growth-promoting gene is an oncogene.

11. The method of claim 10 wherein the oncogene is v-myc.

Sub A3
12. ~~A conditionally-immortalized dorsal root ganglion progenitor cell capable of differentiation into neurons.~~

13. A cell according to claim 12, wherein the cell is a transfected rat dorsal root ganglion progenitor cell.

14. A cell according to claim 12, wherein the cell is a transfected human dorsal root ganglion progenitor cell.

15. A cell according to claim 12, wherein the cell is capable of differentiation into sensory neurons.

16. A cell according to claim 12, wherein the cell is capable of differentiation into nociceptive sensory neurons.

17. A method for producing neurons, comprising culturing a cell produced according to claim 1 or claim 6, under conditions inhibiting expression of the growth-promoting gene.

18. A method according to claim 17, wherein the cells are conditionally-immortalized rat or human dorsal root ganglion progenitor cells, and wherein the cells are cultured on a substrate in the presence of one or more differentiating agents.

19. A neuron produced according to the method of claim 17,

20. A method for producing neurons, comprising culturing a cell according to claim 5 or claim 12, under conditions inhibiting expression of the growth promoting gene.

21. A method according to claim 20, wherein the cells are conditionally-immortalized rat or human dorsal root ganglion progenitor cells, and wherein the cells are cultured in the presence of one or more differentiating agents.

22. A neuron produced according to the method of claim 20.

23. A method for determining whether conditionally-immortalized dorsal root ganglion progenitor cells are capable of differentiation into neurons, comprising the step of determining the presence or absence of β III-tubulin positive cells in the proliferative growth condition, and therefrom determining whether the cells are capable of differentiation into neurons.

24. A method for transplanting a PNS cell into a mammal, comprising administering to a mammal a cell produced according to the method claim 1 or claim 6.

25. A method for transplanting a PNS cell into a mammal, comprising administering to a mammal a cell according to claim 5 or claim 12.

26. A method for treating a patient, comprising administering to a patient a cell produced according to the method of claim 1 or claim 6.

27. A method for treating a patient, comprising administering to a patient a cell according to claim 5 or claim 12.

28. A method according to claim 27, wherein the patient is afflicted with chronic pain and/or a pathological condition characterized by neurodegeneration.

29. A method according to claim 28, wherein the pathological condition is a neuropathy.

30. A method for screening for an agent that modulates activity of a protein produced by a PNS cell, comprising:

(a) contacting a cell produced according to the method of claim 1 or claim 6 with a candidate agent; and

(b) subsequently measuring the ability of the candidate agent to modulate activity of a protein produced by the cell.

31. A method for screening for an agent that modulates activity of a protein produced by a PNS cell, comprising:

(a) contacting a cell according to claim 5 or claim 12, with a candidate agent; and

(b) subsequently measuring the ability of the candidate agent to modulate activity of a protein produced by the cell.

32. A method for detecting the presence or absence of a protein in a sample, comprising:

(a) contacting a sample with a cell produced according to the method of claim 1 or claim 6; and

(b) subsequently detecting a response in the cell, and therefrom detecting the presence of a protein in the sample.

~~33. A method for detecting the presence or absence of a protein in a sample, comprising~~

~~(a) contacting a sample with a cell according to claim 5, or claim 12; and~~

~~(b) subsequently detecting a response in the cell, and therefrom detecting the presence of a protein in the sample.~~

34. A method for identifying a human PNS gene or protein, comprising detecting the presence of a gene or protein within a culture of cells produced according to the method of claim 1 or claim 6.

35. A method for identifying a human PNS gene or protein, comprising detecting the presence of a gene or protein within a culture of cells according to claim 5 or claim 12.

36. A method for screening for an agent that affects PNS cell death, comprising:

(a) contacting a cell produced according to the method of claim 1 or claim 6 with a candidate agent under conditions that, in the absence of candidate agent, result in death of the cell; and

(b) subsequently measuring the ability of the candidate agent to affect the death of the cell, and therefrom identifying an agent that affects PNS cell death.

37. A method for screening for an agent that affects PNS cell death, comprising:

(a) contacting a cell according to claim 5 or claim 12 with a candidate agent under conditions that, in the absence of candidate agent, result in death of the cell; and

(b) subsequently measuring the ability of the candidate agent to affect the death of the cell, and therefrom identifying an agent that affects PNS cell death.

38. A method for screening for a protein that regulates PNS cell death, comprising:

(a) altering the level of expression of a protein within a cell produced according to claim 1 or claim 6; and

(b) subsequently measuring the affect of the alteration on the death of the cell, and therefrom identifying a protein that regulates PNS cell death.

39. A method for screening for a protein that regulates PNS cell death, comprising:

(a) altering the level of expression of a protein within a cell according to claim 5 or claim 12; and

(b) subsequently measuring the affect of the alteration on the death of the cell, and therefrom identifying a protein that regulates PNS cell death.

40. A conditionally-immortalized PNS progenitor cell produced according to the method of claim 1.

41. A cell according to claim 40, wherein the cell is a rat cell.

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42. A conditionally-immortalized PNS progenitor cell produced according to the method of claim 6.

43. A cell according to claim 42, wherein the cell is a rat cell.

44. A cell according to claim ^A42, wherein the cell is a human cell.

45. A cell according to claim 40 or claim 42, wherein the cell is present within a clonal cell line.

46. A cell according to claim 40 or 42, wherein the cell is capable of differentiation into neurons.

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